

Investigate

7 WHICH ABSORBS MORE RADIATION?

Aim

To compare the amount of radiation absorbed by a shiny silver can and a dull black can.

Materials

- 2 thermometers or datalogger and 2 temperature probes
- portable spotlight or electric radiator
- 2 metal cans—one shiny silver and one dull black

NOTES

- 1 Instead of using a spotlight, you could use a microscope lamp, or you could put the cans in direct sunlight.
- 2 If you use empty food cans, you could blacken one by holding it in the smoke from a burning candle. Painted soft drink cans work well.
- 3 To cut down on heat loss by convection, you need lids.

Planning and Safety Check

Read the Method carefully and discuss with your teacher what equipment you will use.

- What safety precautions will be necessary?
- Which can do you predict will absorb more radiation? Why?

In your notebook design a data table in which to record the temperature of each can every minute for 15 minutes.

Method

- 1 Add equal volumes of cold water to both cans.
- 2 Position the spotlight or radiator at an equal distance from each can.
- 3 Record the initial temperature of the water in each can. (These should be the same.)
- 4 Turn on the lamp and at the same time start timing.
Record the temperature in each can every minute for 15 minutes.

- 5 Plot the temperature for both cans on a single graph. (A datalogger will do this for you.) You could use a different colour for each can, but make sure you label the two curves.

Discussion and conclusion

- 1 Which was the independent variable, and which was the dependent variable?
- 2 Which variables did you control?
- 3 Which can absorbed more radiation? How do you know? Was your prediction correct?
- 4 Look at your graph. What does the slope of each line tell you about the warming rate of the can?
- 5 Based on the results of this experiment, write a generalisation saying how the amount of heat absorbed by an object depends on the type of surface.
- 6 Could the experiment be improved? If so, how?

try this

Design a similar experiment to find out which can cools more quickly.

